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CARTER III, ROBERT E

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

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## **DETAILED ACTION**

### ***Response to Amendment***

Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1. Claims 2, 7-10, and 13-19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Regarding the independent claims 2, 7, 15, and 16, the term “scan inverting circuit” is defined by the operational language “a scan inverting circuit for inverting the direction of a horizontal scan along a row on said display panel in each frame or each field”

However, figures 2B and 3 of the disclosure, and page 9, lines 6-12 of the specification defines the scan inverting circuit as a simple inverter which inverts the horizontal direction scan signal output from the scan driving circuit.

The claimed operation of inverting the direction of the horizontal scan along a row (as opposed to inverting the horizontal direction scan signal) is actually performed by the signal driving circuit as explained on page 15, lines 12-15 of the specification.

It is clear from the specification, that the scan inverting circuit is simply an inverter, and that the claimed operation of the scan inverting circuit is actually performed by the signal driving circuit.

Therefore, for the purposes of examination, the examiner has separated the scan inverting circuit and the claimed operation, and defined a new part called a **direction circuit**, which can be considered as part of the signal driving circuit.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 2, 7-10, and 13-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukumoto et al. (Japanese Application # 07-244267, Disclosed in IDS submitted on 12/17/2004, copy also submitted on this date) in view of Guha et al. (US Patent # 5,739,545), Harris et al. (US Patent # 5,115,228) and Jacobsen et al. (US Patent # 6,232,937) and further in view of Liang et al. (US Publication # 2003/0035198).

As for claim 2, Fukumoto et al. (Figs. 1, 3) discloses:

*A display apparatus comprising:*

*a display panel (1) with a first side (Top side of display in figure 1) and a second side (bottom side of display in figure 1),*

*wherein the display panel provides a display that can be observed from either side*

[0004];

*a pair of liquid crystal shutter means (3, 4) disposed in such a manner as to sandwich said display panel [0012]*

*display control means (Fig. 3) for displaying a first image which can be seen from the one side of the display panel and a second image which can be seen from the other side of the display panel [0005]; and*

*liquid crystal shutter control means (7) for opening and closing said pair of liquid crystal shutter means in synchronism with the operation of said display control means in such that they do not open simultaneously, wherein said pair of liquid crystal shutter means are opened and closed by said liquid crystal shutter control means such that said first and second image can be observed as the original display on each side of said display panel [0015-0016].*

Fukumoto et al. does not teach the display panel having a plurality of picture elements.

In the same field of endeavor (i.e. EL displays) Guha et al. (Figs. 3, 8B) discloses:

*a display panel (Fig. 8B) with a first side (top side of display panel in Fig. 8B) and a second side (bottom side of display panel in Fig. 8B), having a plurality of imaging devices (50, 98', 100', 102', 104') which emit light from both sides (Col. 3, lines 25-29) and are arranged in a two-dimensional matrix (Col. 5, lines 36-40, 54-57).*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the display panel of Fukumoto et al. with the display having a plurality of picture elements of Guha et al., to reduce size and improve speed of operation (Guha et al., Col. 5, lines 57-59).

Fukumoto et al. as modified by Guha et al. does not teach a display control means which displays a first image on one side in one frame and a second image on the other side in the next frame, or an LC shutter control means which opens and closes the pair of shutters for each frame.

In the same field of endeavor (i.e. double sided displays) Harris et al. discloses: *display control means (20, 26, 28, 34) for displaying a first image in every frame or every field which can be seen from the one side of the display panel and a second image which can be seen from the other side of the display panel in every other frame or every other field (Col. 3, line 50 – Col. 4, line 4); and liquid crystal shutter control means (22, 24) for opening and closing said pair of liquid crystal shutter means in synchronism with the operation of said display control means in each frame scan or each field scan such that they do not open simultaneously, wherein said pair of liquid crystal shutter means are opened and closed by said liquid crystal shutter control means such that said first and second image can be observed as the original display on each side of said display panel (Col. 3, line 46 – Col. 4, line 4), and wherein said display control means (20, 26, 28, 34) comprises a **scanning** circuit (42, 44) ... which display a first display from the first side of the display panel and a second display from the second side of the display panel (Col. 3, line 46 – Col. 4, line 4); and said liquid crystal shutter control means controls the switching of the opening and closing of said pair of liquid crystal shutter means in response to an output from said **scanning** circuit (42, 44), (Col. 2, lines 44-48).*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the display control means and liquid crystal shutter means in Fukumoto et al. as modified by Guha et al., with the operation of the ones in Harris et al, to allow display of images on both sides of the display simultaneously (Harris et al., Col. 2, lines 20-26)

Fukumoto et al. as modified by Guha et al. and Harris et al. does not teach the display control means comprising a scan inverting circuit.

However, as defined in Figures 2 and 3 of the Applicant's disclosure and pages 9 and 10 of the specification, the scan inverting circuit merely inverts the horizontal scan signal (Page 9, lines 6-12)

The examiner takes Official Notice that inverters in signal paths of display drivers are well known in the art.

Therefore, it would have been obvious to one of ordinary skill in the art to modify the scan driving circuit of Fukumoto et al. as modified by Guha et al. and Harris et al. by adding an inverter to the output, to correct phase and timing of the scan signal.

Since Fukumoto et al. as modified by Guha et al. and Harris et al. teaches a liquid crystal shutter control means which opens and closes the LC shutters in response to an output from a scanning circuit, and adding an inverter to the output of the scanning circuit is well known, the obvious combination of the references teaches:



*said liquid crystal shutter control means controls the switching of the opening and closing of said pair of liquid crystal shutter means in response to an output from said scan inverting circuit.*

Fukumoto et al. as modified by Guha et al. and Harris et al. does not teach the display control means inverting the direction of a horizontal scan along a row on said display panel in each frame or each field.

In the same field of endeavor (i.e. display scan drivers) Jacobsen et al. (Fig. 2C) discloses:

*wherein said display control means (112) comprises a **direction** circuit for inverting the direction of a horizontal scan along a row on said display panel in each frame or each field. (Col. 8, lines 60-62).*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the display control means in Fukumoto et al. as modified by Guha et al. and Harris et al. with the direction inverting technique taught in Jacobsen et al., to improve usability (Jacobsen et al., Col. 8, lines 50-58).

Fukumoto et al. as modified by Guha et al., Harris et al., and Jacobsen et al. does not teach the shutters being able to open and close for a single imaging device.

In the same field of endeavor (i.e. displays using LC shutters) Liang et al. discloses an electrophoretic display using an overlaid LC shutter to switch each imaging device to a black color [0011 – 0012].

Since Fukumoto et al. as modified by Guha et al., Harris et al., and Jacobsen et al. teaches a pair of liquid crystal shutters sandwiching a display, which open and close for a plurality of imaging devices (the entire display), and Liang et al. teaches a display overlaid with an LC shutter capable of opening and closing for a single imaging device, the obvious combination of the references teaches a pair of LC shutters which open and close for a single imaging device.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the shutters in Fukumoto et al. as modified by Guha et al., Harris et al., and Jacobsen et al., with the shutters which can open and close for a single imaging device in Liang et al. to improve color saturation and contrast ratio (Liang et al., [0014]).

Combining Fukumoto et al., Guha et al., Harris et al., Jacobsen et al., and Liang et al. would meet the claim limitations:

*a pair of liquid crystal shutter means disposed in such a manner as to sandwich said display panel for switching on and off each respective imaging device;*

As for claim 7, Fukumoto et al. teaches:

*A display apparatus comprising: a display panel (1), said display panel being capable of display on both surfaces, namely a first surface and a second surface, thereof [0004], first shutter means (3) and second shutter means (4) disposed on said first surface side and said second surface side, respectively [0012], and control means comprising display control means (Fig. 3) for performing display control such that a first display observed from said first surface side and a second*

*display observed from said second surface side can be viewed as the same display [0005], and shutter control means (7) for controlling the opening and closing of shutters such that the display picture... on said second surface side are screened by said second shutter means upon said first display, and the display picture...on said first surface side are screened by said first shutter means upon said second display, wherein said display control means, while switching the display period of said first display and said second display, performs display control such that said first display and said second display have a relationship where they are substantially mirror images of each other upon viewing said first display and said second display from either said first surface side or said second surface side with said shutters open [0015-0016],*

Fukumoto et al. does not teach the display panel having a plurality of picture elements.

In the same field of endeavor (i.e. EL displays) Guha et al. (Figs. 3, 8B) discloses:

*A display panel (Fig. 8B) having a plurality of picture elements (50, 98', 100', 102', 104') that perform display based on an input signal (Col. 5, lines 36-57)*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the display panel of Fukumoto et al. with the display having a plurality of picture elements of Guha et al., to reduce size and improve speed of operation (Guha et al., Col. 5, lines 57-59).

Combining Fukumoto et al. and Guha et al. would meet the claim limitations:

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*shutter control means for controlling the opening and closing of shutters such that the display picture elements on said second surface side are screened by said second shutter means upon said first display, and the display picture elements on said first surface side are screened by said first shutter means upon said second display*

Fukumoto et al. as modified by Guha et al. does not teach the display period being a single frame.

In the same field of endeavor (i.e. double sided displays) Harris et al. discloses: *wherein said display period, in which said first display and said second display are switched is a unit scan period based on a single field unit period or a single frame unit period based on a horizontal scan unit period (Col. 3, line 50 – Col. 4, line 4); and said shutter control means controls the switching of the opening and closing of said first and second shutter means in response to an output from a **scanning** circuit (42, 44), (Col. 2, lines 44-48).*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the display control means and liquid crystal shutter means in Fukumoto et al. as modified by Guha et al. with the operation of the ones in Harris et al, to allow display of images on both sides of the display simultaneously (Harris et al., Col. 2, lines 20-26).

Combining Fukumoto et al., Guha et al., Harris et al., would meet the claim limitations:

*said first and second shutter means being capable of opening and closing for a plurality of picture elements;*

*said display panel being capable of display on both surfaces, namely a first surface and a second surface, thereof, using a picture element at a selected location;*

Since Fukumoto et al. as modified by Harris et al. teaches a first and second shutter means capable of opening and closing for the entire display, and Guha et al. teaches a display having a plurality of picture elements, the obvious combination of the references teaches a first and second shutter means capable of opening and closing for a plurality of picture elements (the entire display).

Since Fukumoto et al. as modified by Harris et al. teaches a display panel capable of display on both surfaces, and Guha et al. teaches a display having a plurality of picture elements, the obvious combination of the references teaches a display panel capable of display on both surfaces using a picture element at a selected location.

Fukumoto et al. as modified by Guha et al. and Harris et al. does not teach the display control means comprising a scan inverting circuit.

However, as defined in Figures 2 and 3 of the Applicant's disclosure and pages 9 and 10 of the specification, the scan inverting circuit merely inverts the horizontal scan signal (Page 9, lines 6-12)

The examiner takes Official Notice that inverters in signal paths of display drivers are well known in the art.

Therefore, it would have been obvious to one of ordinary skill in the art to modify the scan driving circuit of Fukumoto et al. as modified by Guha et al. and Harris et al. by adding an inverter to the output, to correct phase and timing of the scan signal.

Since Fukumoto et al. as modified by Guha et al. and Harris et al. teaches a liquid crystal shutter control means which opens and closes the LC shutters in response to an output from a scanning circuit, and adding an inverter to the output of the scanning circuit is well known, the obvious combination of the references teaches:

*said shutter control means controls the switching of the opening and closing of said first and second shutter means in response to an output from said scan inverting circuit.*

Fukumoto et al. as modified by Guha et al. and Harris et al. does not teach the display control means inverting the direction of a horizontal scan along a row on said display panel in each frame unit period or each field unit period

In the same field of endeavor (i.e. display scan drivers) Jacobsen et al. (Fig. 2C) discloses:

*said display control means (112) comprises a **direction** circuit for inverting the direction of a horizontal scan along a row on said display panel in each frame unit period or each field unit period (Col. 8, lines 60-62).*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the display panel and display control means in Fukumoto et al. as modified by Guha et al. and Harris et al. with the direction inverting

technique taught in Jacobsen et al., to improve usability (Jacobsen et al., Col. 8, lines 50-58).

As for claim 8, Harris et al. teaches:

*wherein said shutter control means controls the opening and closing of shutters in synchronism with the switching of said display period by said display control means* (Col. 2, lines 44-48).

As for claim 9, Fukumoto et al. as modified by Guha et al., Harris et al., and Jacobsen et al. teaches all the limitations of claim 7.

Fukumoto et al. as modified by Guha et al., Harris et al. does not teach the control means comprising a memory circuit or a signal driving circuit.

Jacobsen et al. teaches:

*wherein said control means comprises:*

*A memory circuit (107, 108, 109) for storing a data signal in each horizontal scan unit period of said picture element based on said input signal* (Col. 8, lines 34-38)

*said **direction** circuit for inverting the scan order in each said horizontal scan unit period* (Col. 8, lines 60-62).

*A signal driving circuit (44a, 44b, 44c, 44d) for outputting a data signal to said display panel* (Col. 7, lines 37-39) *in order to perform a first image display by said scan order and a second image display by the inverted scan order based on an inverted scan signal at different times, based on said data signal stored in said memory circuit and said inverted scan signal outputted from said scan inverting circuit* (Col. 8, lines 34-62,

the inverted scan signal is always applied to the scan lines regardless of which side of the display is being driven).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the display control means in Fukumoto et al. as modified by Guha et al. and Harris et al. with the direction inverting signal driving circuit of Jacobsen et al., to improve usability (Jacobsen et al., Col. 8, lines 50-58).

Fukumoto et al. as modified by Guha et al., Harris et al., and Jacobsen et al. does not teach a signal inverting circuit.

However, as defined in Figures 2 and 3 of the Applicant's disclosure and pages 9 and 10 of the specification, the signal inverting circuit merely inverts the horizontal scan inverted signal output from the scan inverting circuit (Page 9, lines 24-27)

The examiner takes Official Notice that inverters in signal paths of display drivers are well known in the art.

Therefore, it would have been obvious to one of ordinary skill in the art to modify the scan driving circuit of Fukumoto et al. as modified by Guha et al. and Harris et al. by adding an inverter to the output, to correct phase and timing of the scan signal.

Since Fukumoto et al. as modified by Guha et al., Harris et al., and Jacobsen et al. teaches a liquid crystal shutter control means which opens and closes the LC shutters in response to an output from a scanning circuit, and adding an inverter to the



output of the scanning circuit is well known, the obvious combination of the references teaches:

*A signal inverting circuit for inverting the inverted scan signal outputted from said scan inverting circuit.*

Fukumoto et al. as modified by Guha et al., and Jacobsen et al. does not teach a shutter switching circuit.

Harris et al. teaches:

*a shutter switching circuit (26, 28) for controlling the opening and closing of said first shutter means and said second shutter means based on an output signal from a **scanning** circuit (42, 44), wherein, upon alternatively displaying either said first display or said second display outputted from said signal driving circuit in each said horizontal scan unit period, the display surface side on which display has not been selected is screened alternatively by said first or second shutter means (Col. 2, lines 44-48).*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the display control means of Fukumoto et al. as modified by Guha et al., with the shutter switching circuit of Harris et al, to allow display of images on both sides of the display simultaneously (Harris et al., Col. 2, lines 20-26).

As stated in the rejection of claim 7 above, placing an inverter at the output of the scanning circuit of Harris is well known. Therefore Harris et al. teaches:

*a shutter switching circuit for controlling the opening and closing of said first shutter means and said second shutter means based on an output signal from said scan inverting circuit.*

As for claim 10, Fukumoto et al. teaches:

*wherein said first and second shutter means are formed by liquid crystal panels disposed on said first display surface and said second display surface, respectively, in an opposing manner [0006], [0012].*

As for claim 13, Fukumoto et al. as modified by Guha et al., Harris et al., and Jacobsen et al. teaches all the limitations of claim 7.

Fukumoto et al. as modified by Guha et al., Harris et al. does not teach the control means comprising a memory circuit or a signal driving circuit.

Jacobsen et al. teaches:

*wherein said control means comprises:*

*a memory circuit (107, 108, 109) for storing a data signal in each scan unit of said picture element based on said input signal (Col. 8, lines 34-38);*

*a scan driving circuit (46a, 46b) for providing a scan driving signal to said display panel in the scan order of each said scan unit (Col. 7, lines 39-47);*

*a signal driving circuit (44a, 44b, 44c, 44d) for changing the output order of said image signal received from a memory circuit in each scan order, while outputting to the display panel an image signal that is used to perform a first image display by said scan order and a second image display by the inverted scan order based on an inverted scan signal at different times, based on said data signal stored in said memory circuit and the scan driving signal outputted from the scan driving circuit (Col. 8, lines 34-62, the inverted scan signal is always applied to the scan lines regardless of which side of the display is being driven).*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the display control means in Fukumoto et al. as modified by Guha et al. and Harris et al. with the memory circuit, scan driving circuit, and direction inverting signal driving circuit of Jacobsen et al., to improve usability (Jacobsen et al., Col. 8, lines 50-58).

Fukumoto et al. as modified by Guha et al., Harris et al., and Jacobsen et al. does not teach a signal inverting circuit.

However, as defined in Figures 2 and 3 of the Applicant's disclosure and pages 9 and 10 of the specification, the signal inverting circuit merely inverts the horizontal scan inverted signal output from the scan inverting circuit (Page 9, lines 24-27)

The examiner takes Official Notice that inverters in signal paths of display drivers are well known in the art.

Therefore, it would have been obvious to one of ordinary skill in the art to modify the scan inverting circuit of Fukumoto et al. as modified by Guha et al. and Harris et al. by adding an inverter to the output, to correct phase and timing of the scan signal.

Since Fukumoto et al. as modified by Guha et al., Harris et al., and Jacobsen et al. teaches a liquid crystal shutter control means which opens and closes the LC shutters in response to an output from a scanning circuit, and adding an inverter to the output of the scanning circuit is well known, the obvious combination of the references teaches:

*a signal inverting circuit for inverting the inverted scan signal outputted from said scan inverting circuit;*

Fukumoto et al. as modified by Guha et al., and Jacobsen et al. does not teach a shutter switching circuit.

Harris et al. teaches:

*a shutter switching circuit (26, 28) for controlling the opening and closing of said first shutter means and said second shutter means based on an output signal from a **scanning** circuit (42, 44), wherein, upon alternatively displaying either said first display or said second display based on said image signal outputted from said signal driving circuit in each said scan unit, the display surface side on which display has not been selected is screened alternatively by said first or second shutter means (Col. 2, lines 44-48).*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the display control means of Fukumoto et al. as modified by Guha et al., with the shutter switching circuit of Harris et al, to allow display of images on both sides of the display simultaneously (Harris et al., Col. 2, lines 20-26).

As stated in the rejection of claim 7 above, placing an inverter at the output of the scanning circuit of Harris is well known. Therefore Harris et al. teaches:

*a shutter switching circuit for controlling the opening and closing of said first shutter means and said second shutter means based on an output signal from said scan inverting circuit.*

As for claim 14, Fukumoto et al. teaches:

*wherein said first and second shutter means are formed by liquid crystal panels disposed on said first display surface and said second display surface, respectively, in an opposing manner [0006], [0012].*

As for claim 15, Fukumoto et al. teaches:

*A display apparatus comprising: a display panel (1), said display panel being capable of display on both surfaces, namely a first surface and a second surface that is opposite to said first surface, thereof [0004],*

*first shutter means (3) and second shutter means (4) disposed on said first surface side and said second surface side, respectively [0012]*

*control means comprising display control means (Fig. 3) for performing display control of a first display observed from said first surface side and a second display, which is different from said first display, observed from said second surface side, and shutter control means for controlling said shutter means such that a regular image can be observed from both surfaces of said display panel, wherein the control of the opening and closing of shutters are performed such that the display picture... on said second surface side are screened while transmitting the display picture...on said first surface side by said second shutter means upon said first display, and such that the display picture...on said first surface side are screened while transmitting the display picture...on said second surface side by said first shutter means upon said second display [0015-0016],*

Fukumoto et al. does not teach the display panel having a plurality of picture elements.

In the same field of endeavor (i.e. EL displays) Guha et al. (Figs. 3, 8B) discloses:

*A display panel (Fig. 8B) having a plurality of picture elements (50, 98', 100', 102', 104'), comprising at least a first picture element (50) displaying toward a first display side and toward a second side of the display panel (Col. 3, lines 25-29), and that perform display based on an input signal (Col. 5, lines 36-57).*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the display panel of Fukumoto et al. with the display having a plurality of picture elements of Guha et al., to reduce size and improve speed of operation (Guha et al., Col. 5, lines 57-59).

Combining Fukumoto et al. and Guha et al. would meet the claim limitations:  
*wherein the control of the opening and closing of shutters are performed such that the display picture elements on said second surface side are screened while transmitting the display picture elements on said first surface side by said second shutter means upon said first display, and such that the display picture elements on said first surface side are screened while transmitting the display elements on said second surface side by said first shutter means upon said second display*

Fukumoto et al. as modified by Guha et al. does not teach the LC shutter control means for displaying a regular image on both sides of the display simultaneously.

In the same field of endeavor (i.e. double sided displays) Harris et al. discloses:

*shutter control means (22, 24) for controlling said shutter means such that a regular image can be observed simultaneously from both surfaces of said display panel (Col. 3, line 46 – Col. 4, line 4),*

*said shutter control means controls the switching of the opening and closing of said first and second shutter means in response to an output from **a scanning** circuit (42, 44), (Col. 2, lines 44-48).*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the display control means and liquid crystal shutter means in Fukumoto et al. as modified by Guha et al. with the operation of the ones in Harris et al, to allow display of images on both sides of the display simultaneously (Harris et al., Col. 2, lines 20-26).

Combining Fukumoto et al., Guha et al., and Harris et al. would meet the claim limitations:

*first shutter means and second shutter means disposed on said first surface side and said second surface side, respectively, that are capable of opening and closing for a plurality of picture elements; and*

*said display panel being capable of display on both surfaces, namely a first surface and a second surface that is opposite to said first surface, thereof, using a picture element at a selected location;*

Since Fukumoto et al. as modified by Harris et al. teaches a first and second shutter means capable of opening and closing for the entire display, and Guha et al. teaches a display having a plurality of picture elements, the obvious combination of the references teaches a first and second shutter means capable of opening and closing for a plurality of picture elements (the entire display).

Since Fukumoto et al. as modified by Harris et al. teaches a display panel capable of display on both surfaces, and Guha et al. teaches a display having a plurality of picture elements, the obvious combination of the references teaches a display panel capable of display on both surfaces using a picture element at a selected location.

Fukumoto et al. as modified by Guha et al. and Harris et al. does not teach the display control means comprising a scan inverting circuit.

However, as defined in Figures 2 and 3 of the Applicant's disclosure and pages 9 and 10 of the specification, the scan inverting circuit merely inverts the horizontal scan signal (Page 9, lines 6-12)

The examiner takes Official Notice that inverters in signal paths of display drivers are well known in the art.

Therefore, it would have been obvious to one of ordinary skill in the art to modify the scan driving circuit of Fukumoto et al. as modified by Guha et al. and Harris et al. by adding an inverter to the output, to correct phase and timing of the scan signal.

Since Fukumoto et al. as modified by Guha et al. and Harris et al. teaches a liquid crystal shutter control means which opens and closes the LC shutters in response



to an output from a scanning circuit, and adding an inverter to the output of the scanning circuit is well known, the obvious combination of the references teaches:

*said shutter control means controls the switching of the opening and closing of said first and second shutter means in response to an output from said scan inverting circuit.*

Fukumoto et al. as modified by Guha et al. and Harris et al. does not teach the display control means inverting the direction of a horizontal scan along a row on said display panel in each frame unit period or each field unit period

In the same field of endeavor (i.e. active matrix display drivers) Jacobsen et al. (Fig. 2C) discloses:

*said display control means (112) comprises a **direction** circuit for inverting the direction of a horizontal scan along a row on said display panel in each frame or each field (Col. 8, lines 60-62).*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the display panel and display control means in Fukumoto et al. as modified by Guha et al. and Harris et al. with the direction inverting technique taught in Jacobsen et al., to improve usability (Jacobsen et al., Col. 8, lines 50-58).

As for claim 16, Fukumoto et al. teaches:

*A display apparatus comprising: a display panel (1) having a first display surface and a second display surface and capable of display from both said first display surface and said second display surface [0004],*

*first shutter means (3) and second shutter means (4) disposed on said first surface side and said second surface side, respectively [0012], control means comprising display control means (Fig. 3) for performing display control of a first display observed from said first display surface side and a second display, which is different from said first display, observed from said second display surface side [0005], and liquid crystal shutter control means (7) for controlling said first and second shutter means such that a regular image can be observed from both surfaces of said display panel by screening the display picture...on said second display surface side while transmitting the display picture...on said first display surface side by said second shutter means upon said first display, and by screening the display picture...on said first display surface side while transmitting the display picture...on said second display surface side by said first shutter means upon said second display [0015-0016].*

Fukumoto et al. does not teach the display panel having a plurality of display elements.

In the same field of endeavor (i.e. EL displays) Guha et al. (Figs. 3, 8B) discloses:

*A display apparatus comprising: a display panel (Fig. 8B) having a first display surface (top side of display panel in Fig. 8B) and a second display surface (bottom side of display panel in Fig. 8B)...said display panel having a plurality of display elements (50, 98', 100', 102', 104');*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the display panel of Fukumoto et al. with the

display having a plurality of picture elements of Guha et al., to reduce size and improve speed of operation (Guha et al., Col. 5, lines 57-59).

Combining Fukumoto et al. and Guha et al. would meet the claim limitations:

*liquid crystal shutter control means (7) for controlling said first and second shutter means such that a regular image can be observed from both surfaces of said display panel by screening the display picture elements on said second display surface side while transmitting the display picture elements on said first display surface side by said second shutter means upon said first display, and by screening the display picture elements on said first display surface side while transmitting the display elements on said second display surface side by said first shutter means upon said second display*

Fukumoto et al. as modified by Guha et al. does not teach the LC shutter control means for displaying a regular image on both sides of the display simultaneously.

In the same field of endeavor (i.e. double sided displays) Harris et al. discloses:

*liquid crystal shutter control means (22, 24) for controlling said liquid crystal shutter means such that a regular image can be observed simultaneously from both surfaces of said display panel (Col. 3, line 46 – Col. 4, line 4),*

*said liquid crystal shutter control means controls the switching of the opening and closing of said pair of liquid crystal shutter means in response to an output from a **scanning** circuit (42, 44), (Col. 2, lines 44-48).*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the display control means and liquid crystal

shutter means in Fukumoto et al. as modified by Guha et al. with the operation of the ones in Harris et al, to allow display of images on both sides of the display simultaneously (Harris et al., Col. 2, lines 20-26)

Fukumoto et al. as modified by Guha et al. and Harris et al. does not teach the display control means comprising a scan inverting circuit.

However, as defined in Figures 2 and 3 of the Applicant's disclosure and pages 9 and 10 of the specification, the scan inverting circuit merely inverts the horizontal scan signal (Page 9, lines 6-12)

The examiner takes Official Notice that inverters in signal paths of display drivers are well known in the art.

Therefore, it would have been obvious to one of ordinary skill in the art to modify the scan driving circuit of Fukumoto et al. as modified by Guha et al. and Harris et al. by adding an inverter to the output, to correct phase and timing of the scan signal.

Since Fukumoto et al. as modified by Guha et al. and Harris et al. teaches a liquid crystal shutter control means which opens and closes the LC shutters in response to an output from a scanning circuit, and adding an inverter to the output of the scanning circuit is well known, the obvious combination of the references teaches:

*said liquid crystal shutter control means controls the switching of the opening and closing of said first and second shutter means in response to an output from said scan inverting circuit.*

Fukumoto et al. as modified by Guha et al. and Harris et al. does not teach the display control means inverting the direction of a horizontal scan along a row on said display panel in each frame unit period or each field unit period

In the same field of endeavor (i.e. active matrix display drivers) Jacobsen et al. (Fig. 2C) discloses:

*said display control means (112) comprises a **direction** circuit for inverting the direction of a horizontal scan along a row on said display panel in each frame or each field (Col. 8, lines 60-62).*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the display control means in Fukumoto et al. as modified by Guha et al. and Harris et al. with the direction inverting technique taught in Jacobsen et al., to improve usability (Jacobsen et al., Col. 8, lines 50-58).

Fukumoto et al. as modified by Guha et al., Harris et al., and Jacobsen et al. does not teach the shutters being able to open and close for a single display element.

In the same field of endeavor (i.e. displays using LC shutters) Liang et al. discloses an electrophoretic display using an overlaid LC shutter to switch each pixel to a black color [0011 – 0012].

Since Fukumoto et al. as modified by Guha et al., Harris et al., and Jacobsen et al. teaches a pair of liquid crystal shutters sandwiching a display, which open and close for a plurality of display elements (the entire display), and Liang et al. teaches a display overlaid with an LC shutter capable of opening and closing for a single display element,

the obvious combination of the references teaches a pair of LC shutters which open and close for a single display element.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the shutters in Fukumoto et al. as modified by Guha et al., Harris et al., and Jacobsen et al., with the shutters which can open and close for a single picture element in Liang et al. to improve color saturation and contrast ratio (Liang et al., [0014]).

Combining Fukumoto et al., Guha et al., Harris et al., Jacobsen et al., and Liang et al. would meet the claim limitations:

*first shutter means and second shutter means disposed on said first surface side and said second surface side, respectively, that are capable of opening and closing for each said display element;*

As for claim 17, Harris et al. teaches:

*wherein the display control means (20, 26, 28, 34) of said display panel (10) and said shutter means (16, 18) are controlled by the same circuit (34).*

As for claim 18, Fukumoto et al. teaches:

*A terminal apparatus comprising the display apparatus according to claim 2*  
(Paragraphs [0020-0021], Fig. 3).

As for claim 19, this claim is identical to claim 13, and therefore is rejected in the same manner as claim 13.

***Response to Arguments***

Applicant's request for withdraw of finality of the previous office action filed on 04/29/2009 has been reviewed and granted.

The Examiner provides Ichikawa et al. (US Patent # 6,599,821) as an evidentiary reference to support the Official Notice taken that inverters in signal paths of display drivers are well known in the art. The Examiner would also like to point out that this reference was previous cited by the examiner on 05/19/2008 as teaching bi-directional driver circuits and therefore was already on the record.

Fig. 7 and Col. 10, line 51- Col. 11, line 17 of Ichikawa et al. teaches placing inverters (52, 53, 54, 55) in the signal path between the gate driver 51 and the gate lines (56, 57, 58, 59) and further teaches using a different number of inverters for n-MOS gate lines than for p-MOS gate lines to correct the phase and timing of the gate signals as stated in the motivation used by the Examiner in the original Official Notice rejections.

No changes have been made to the rejection and therefore the current Office Action is made final.

Applicant's arguments filed on 06/16/2009 have been fully considered but they are not persuasive.

Regarding the § 112~ first paragraph rejection of claims 2, 7-10 and 13-19, Applicant argues:

“the Office Action alleges that the term "scan inverting circuit" is not enabled.

The present application is concerned with timing of control signals for a two-sided display panel. Thus, Fig. 2 of the present application shows only signal lines for control signals necessary to explain the present invention. Fig. 2 is not a detailed diagram of all signal paths in the display device. For example, the disclosed scan driving circuit 13 generates driving signals for the display panel, but only a "horizontal direction scan signal" is shown in Fig. 2. The "horizontal direction scan signal" is a control signal that controls the direction of horizontal scan in the display panel. The "horizontal direction scan signal" is not the "horizontal scan signal."

The Examiner insists on an unintended interpretation of the present invention. For example, the Examiner asserts that it is impossible for the row driver (i.e., scan driving circuit) to generate a direction signal that inverts the direction of a horizontal scan. Applicant submits that it is not impossible. As disclosed in the present application, the scan driving circuit 13 generates, in addition to other things such as providing row driving signals, a horizontal direction scan signal hsi. It appears that the Examiner has confused this signal with the term "horizontal scan signal." The "horizontal direction scan signal" is not the same signal as a "horizontal scan signal." Furthermore, the present application does not disclose that the scan driving circuit 13 generates a horizontal scan signal.”

The Examiner fully understands that the "horizontal direction scan signal" is not the same as the "horizontal scan signal". What the Examiner asserts is that in order to invert the direction of the horizontal scan, the "horizontal direction scan signal" must



modify the "horizontal scan signal" so that the scanning is performed in the opposite direction. However, the disclosure of the instant application does not support the "horizontal direction scan signal" affecting the "horizontal scan signal" in any way, and indeed does not even teach a "horizontal scan signal". As is well known in the display art the "horizontal scan signal" is the signal applied to the data driver that controls the timing and direction of the horizontal scan of the data or column lines. Paragraph [0029] of the PG pub of the instant application describes the "horizontal direction scan signal" hsi as being applied directly to the scan or row line. Therefore the invention is not enabled because the disclosure does not explain how it is possible for the "horizontal direction scan signal" to possibly invert the direction of the horizontal scan when the "horizontal direction scan signal" is applied directly to the rows of the display when only a signal applied to the data driver can possibly invert the direction of the horizontal scan, thereby achieving the mirrored image on the display as desired.

Applicant further argues:

"The Examiner's insistence on an incorrect interpretation of the claimed invention cannot be the basis for an assertion of non-enablement. Applicant submits that it is improper to interpret the claims incorrectly, then argue that the invention is not enabled. Instead, Applicant submits that the present invention is enabled for the correct interpretation as described in the specification. Furthermore, the present application discloses necessary control signals, associated timing, and responsible components for enabling one of ordinary skill in the art to make and use the invention."

The Examiner's interpretation of the claims is not incorrect. The claims state:

"a scan inverting circuit for inverting the direction of a horizontal scan along a row on said display panel in each frame or each field"

However, as shown in the response to arguments above, it is not possible for the scan inverting circuit to perform this function when the "horizontal direction scan signal" hsi is applied directly to the scan or row line. In order for the scan inverting circuit to perform this function, the "horizontal direction scan signal" hsi would have to be applied to the data driver, which is not supported by the disclosure. Therefore the Examiner is not interpreting the claims incorrectly, and the invention is clearly not enabled.

Furthermore, the disclosure is clearly deficient in disclosing the necessary control signals, associated timing, and responsible components for enabling one of ordinary skill in the art to make and use the invention.

Regarding the § 103(a) Rejection of claims 2, 7-10, and 13-19 as being unpatentable over JP 07-244,267 (Fukumoto) in view of U.S. Patent 5,739,545 (Guha), U.S. Patent 5,115,228 (Harris), U.S. Patent 6,232,937 (Jacobson; newly cited), and U.S. Publication 2003/0035198 (Liang), applicant argues:

"Applicant submits that the combination of prior art references fails to teach the claimed display apparatus in which the "horizontal direction scan signal" is generated based on the timing of the frame period of the image signal source and controls both the direction of horizontal scan and the timing of shutters for the two sided display panel. The use of a common control signal and respective timing enable a simple control circuit for a two-

sided display panel.

Harris which the Office Action relies on for teaching a display control means does not teach generation of a "horizontal direction scan signal" in synchronism with the frame signal that synchronizes timing and controls both the direction of horizontal scan of a display panel (via a horizontal direction scan inverted signal) and the timing of the shutters of the display panel. Applicant submits that the other cited references fail to make up for the above-stated deficiencies in Harris.

Therefore, Applicant submits that the rejection fails to establish *prima facie* obviousness and must be withdrawn."

However, Applicant's argument relies on the assumption that the "horizontal scan circuit" and "horizontal direction scan signal" are properly enabled. However, as shown in the response to arguments above, they are clearly not enabled.

Therefore the Examiner is forced to interpret the invention such that it is enabled, which requires the "horizontal direction scan signal" to only control the timing of the shutters and the definition of a new circuit called a direction circuit which sends a signal to the data driver to perform the function of inverting the direction of the horizontal scan.

As shown in the rejections of the claims, Harris clearly teaches a scanning circuit which emits a scanning signal based on the timing of the frame period of the image signal source and controls the timing of the shutters.

Likewise Jacobsen et al. teaches the direction circuit which emits a signal based on the timing of the frame period of the image signal source and controls the direction of horizontal scan.

Therefore the combination of the prior art references teaches all the limitations of the claims when they are properly enabled.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Ichikawa et al. (US Publication # 2002/0036606) discloses placing inverters (52, 53, 54, 55) in the signal path between the gate driver 51 and the gate lines (56, 57, 58, 59) and further teaches using a different number of inverters for n-MOS gate lines than for p-MOS gate lines to correct the phase and timing of the gate signals (Fig. 7, [0083]).

Jacobsen et al. (US Publication # 2001/0017604) discloses placing inverters in the signal path between the gate driver and the gate lines (Figs. 2J, 2K, 2L).

Kwon (US Patent # 5,850,216) discloses placing inverters in the signal path between the gate driver and the gate lines (Fig. 16).

Kim (US Patent # 5,963,188) discloses placing inverters in the signal path between the gate driver and the gate lines (Figs. 1, 2A, 3A).

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT E. CARTER III whose telephone number is (571)270-3006. The examiner can normally be reached on 9AM - 5:30PM Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sumati Lefkowitz can be reached on 571-272-3638. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2629

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/R.E.C./

/Richard Hjerpe/  
Supervisory Patent Examiner, Art Unit 2629